

REVIEW ANALYSIS & EVALUATION

# MINI IMPLANT-RETAINED COMPLETE OVERDENTURE CAN BE AN ALTERNATIVE TREATMENT OPTION FOR SELECTED PATIENTS



REVIEWER  
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Is the mini implant-retained overdenture an alternative option when standard implant treatment is not feasible?

SORT SCORE			
A	B	C	NA

SORT, Strength of Recommendation Taxonomy

Level Of EVIDENCE		
1	2	3

See page 11A for complete details regarding SORT and LEVEL OF EVIDENCE grading system

## ARTICLE TITLE AND BIBLIOGRAPHIC INFORMATION

*Complete overdentures retained by mini implants: A systematic review. Lemos CAA, Verri FR, de Souza Batista VE, Santiago JF Jr, Mello CC, Pellizzer EP. J Dent 2017;57:4-13.*

## SOURCE OF FUNDING

*The authors did not report any external sources of fund.*

## TYPE OF STUDY/DESIGN

*Systematic review.*

## SUMMARY

### Selection Criteria

Two authors searched references that were published up to September 2016 from the PubMed/MEDLINE, Embase, and the Cochrane Library databases using specific term search strategy such as mini dental implants, narrow diameter implants, mini implant overdentures, or mini implants, and prosthodontics.

The inclusion criteria were the following: clinical human studies, randomized controlled trials (RCTs) or prospective studies that evaluated the use of mini implants for overdentures, and studies published in English.

Initially, 1273 references were screened and 942 manuscripts remained after duplicated references were removed. Forty studies were eligible for full-text searching after the titles and abstracts review. Upon closer review, 16 manuscripts were removed by exclusion criteria. A total of 24 studies, 4 RCTs and 20 prospective studies, were included for systematic review.

### Key Study Factor

This systematic review included 24 studies with a total of 2494 mini implants and 386 standard implants placed in 896 patients (mean age of 65.93 years). A total of 2330 mini implants were placed in the mandible (93.42%) and 164 mini implants were placed in the maxilla (6.58%). The mean follow-up time was 2.48 years (range: 1-7 years).

### Main Outcome Measure

The primary outcome was the survival rate of the mini implants, and the secondary outcomes included marginal bone loss and satisfaction and quality of life with mini implant-retained overdentures.

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## Main Results

### *The Survival Rate of Mini Implants*

For the 2494 mini implants placed in 15 studies, the mini implant survival rate was 92.32% with 1-7 years of follow-up. A lower survival rate (68.29%) was found for the maxillary arch (52 of 164 mini implants failed). In mandibular sites, the survival rate was 95.11% (69 of 1412 mini implants failed).

### *The Marginal Bone Loss of Mini Implants*

Seven studies showed the vertical marginal bone loss around the mini implants. The results were less than 1.5 mm except in one study (<1.5 mm in maxillary sites).<sup>1</sup>

### *The Satisfaction and Quality of Life*

The indices used in these studies included oral health–related quality of life, Oral Health Impact Profile (OHIP-EDENT; OHIP-G13; OHIP-20), Global Oral Health Assessment Index, Visual Analog Scale Satisfaction, and Patient Satisfaction Questionnaire. Overall, mini implant–retained overdentures showed increased patient satisfaction and quality of life.

### *The Mini Implant–Retained Overdenture Survival*

In 7 studies, a total of 244 mini implant–retained overdentures were evaluated, 23 overdentures fractures were reported, and the overall survival rate was 90.58%.

## Conclusions

The authors concluded that the use of mini implants for retaining overdenture prostheses may be considered as an alternative treatment when standard implant treatment is not feasible. This study shows a high survival rate for mini implants, acceptable marginal bone loss, and improvement of patient satisfaction and quality of life.

## COMMENTARY AND ANALYSIS

For more than a century, conventional complete dentures have been used as the traditional standard of care for edentulous patients without any alternative options. Many patients have struggled to use these prostheses. The instability of the denture, caused by the lack of retention and stability, may cause discomfort and lead to functional and psychosocial problems. The McGill and the York consensus statements support the use of 2 standard implants and recommend this as the first choice for overdenture prostheses in edentulous patients.<sup>2,3</sup>

The mini implants have been used on implant-retained overdentures when standard implants are not feasible. This includes conditions such as the need for advanced bone graft procedures and when bone graft procedures are not predictable because of the patient's health. In addition, mini implants provide greater cost-effectiveness and less morbidity under certain circumstances.<sup>4</sup>

This systematic review was well conducted, showed inclusion and exclusion criteria, followed the Preferred Reporting Items for Systemic Review and Meta-Analysis guideline, and provided quality assessment for the level of evidence using the National Health and Medical Research Council and Newcastle-Ottawa Scale. This study shows promising results for the survival rate of mini implants, marginal bone loss on mandibles, higher patient satisfaction levels, and greater quality of life.

Fifteen studies evaluated the survival rate of mini implants under the Kaplan-Meier method with 7 years of follow-up. A total of 1576 mini implants were placed, and 121 implants failed (7.6%). Most of the failures occurred within the first 2 years after placement. This high survival rate (92.3%) is similar to the results for standard implants, although a higher failure rate was found in the maxilla.<sup>1</sup> This high maxillary rate of failure may relate to lower bone density and biomechanical factors. However, additional and further investigations are needed.

Seven studies were reviewed for marginal bone loss around the mini implants, and the results were acceptable (>1.5 mm). However, most of these marginal bone loss studies evaluated the mandible and their observations lasted for relatively short periods (less than 3 years, except one for 5 years). One study was performed on the maxilla for just 6- to 24-month observation periods, and the vertical marginal bone loss was 4.40-6.29 mm.<sup>1</sup> Although only 1 study focused on the maxilla, the result was quite different from that seen for mandibular marginal bone loss. The wisdom of using mini implants in maxillary sites remains uncertain; further evaluations and studies are needed to study the high maxillary failures rates for mini implants.

It has been well documented that 2 implant-retained overdentures provide better patient satisfaction and quality of life than conventional complete dentures.<sup>5-7</sup> This systematic review demonstrated that mini implant–retained overdentures demonstrate better retention, stability, chewing, speaking, and comfort, along with improved patient satisfaction and quality of life when compared with conventional denture. Even a few studies show equal or better oral health–related quality of life than with standard implant–retained overdentures. These results may be related to the number of mini implants and the retention system.

Number and length of mini implants affected the survival rate of mini implants. Higher failure rate was found in 2 mini implant–retained overdentures compared with those using 4 mini implants and with 2 standard implant–retained overdentures.<sup>8</sup> Short (7-10 mm) mini implants showed a higher failure rate than longer mini implants.<sup>9</sup>

Among the 24 studies selected, most were evaluated only on the mini implants themselves, and the majority used a

single implant system (MDI–O–Ball, 3M–ESPE). A few studies compared standard implants with different numbers of implants.<sup>8,10</sup> It is too early to conclude that the use of mini implants shows equal or better value than the use of standard implants due to the limited number of studies and the short follow-up.

Based on this systematic review, the mini implant–retained overdenture may be used in the mandible with 4 or more implants and certain lengths when standard implants are not feasible. Clinicians should consider patients who have a limited bone width ( $\leq 6$  mm) and bone graft as unsuitable for standard implant–retained overdentures, but those with a bone height  $> 10$  mm on mandible with maxillary complete denture are suitable candidates for a mini implant–retained overdenture.

The authors suggest that more well-designed RCTs should be done to investigate further, although the difficulty of performing well-designed RCTs in this area is recognized. The current evidence is based on clinical follow-up studies, so further studies and long-term follow-up are needed.

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